- 1. An apparatus for delivering a compound through 1 an epithelial tissue layer, the apparatus comprising 2 a reservoir for containing a coupling medium 3 suitable for mixing with the compound, wherein the reservoir 4 is arranged to enable the coupling medium to directly 5 contact a surface of the epithelial tissue layer; and 6 7 an energy source arranged and controlled to propagate an impulse transient within the coupling medium when in the reservoir.
- 2. An apparatus of claim 1, wherein the energy source is a laser, and the apparatus further comprises a target material arranged between the laser and the reservoir, and wherein the reservoir is configured to enable the target material to directly contact the coupling material in the reservoir.
- 3. An apparatus of claim 2, wherein the target
 material is a metal foil or plastic sheet.
- 4. An apparatus of claim 1, further comprising a transparent material bonded to a surface of the target material and interposed between the surface and the laser, and arranged to confine pressure forces resulting from ablation of the target material within the reservoir.
- 5. An apparatus of claim 1, wherein the energy source is a lithotriptor.
- 6. An apparatus of claim 3, wherein the metal foil comprises aluminum or copper.

- 7. An apparatus of claim 2, wherein the target material comprises a polymer. 2
- 8. A system for delivering a compound through an 1
- epithelial cell layer in an animal, the system comprising 2
- an apparatus of claim 1; and
- a coupling medium suitable for mixing with the 4
- . 2 compound.

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- 9. A method of delivering a compound through an 1 epithelial tissue layer, the method comprising: - 2
 - (a) mixing the compound with a coupling medium to form a compound-coupling medium mixture;
- (b) contacting a surface of the epithelial tissue 5 6
- layer with the compound-coupling medium mixture; and 7
- (c) propagating one or more impulse transients 8
- through the compound-coupling medium mixture to contact and
- enter the epithelial tissue layer, whereby the compound 9
- passes through the epithelial tissue layer. 10
 - 10. A method of claim 9, wherein each impulse 1
- transient is a broad-band compressive wave having a rise 2
- time of at least 1 ns and a peak pressure of at least 300 3
- bar and no more than 2000 bar. 4
- 11. A method of claim 9, wherein the impulse 1
- transient is generated by exposing a target material to a 2
- pulsed laser beam. 3
- 1 The method of claim 11 wherein a transparent
- material is bonded to a surface of the target material. 2

- 1 13. A method of claim 9, wherein the compound is a 2 nucleic acid.
- 1 14. A method of claim 9, wherein the compound is an 2 anti-neoplastic agent.
- 1 15. The method of claim 11, wherein the target
- 2 material comprises a metallic foil or a plastic sheet, and
- 3 wherein the impulse transient is generated by a laser-
- 4 induced plasma formed by ablation of the target material.
- 1 16. The method of claim 15, wherein the metallic 2 foil comprises aluminum or copper.
- 1 17. The method of claim 11, wherein the target 2 material comprises a polymer.
- 1 18. The method of claim 11, wherein the target
- 2 material comprises an absorbing material, and wherein the
- 3 impulse transient is generated by laser-induced rapid
- 4 heating of said absorbing material.
- 1 19. A method of claim 9, further comprising a step 2 of applying hydrostatic pressure.
- 1 20. A method of claim 9, wherein the epithelial
- 2 tissue layer is stratum corneum.
- 1 21. A method of claim 9, wherein said coupling 2 medium further comprises a surfactant.
- 1 22. A method of claim 21, wherein said surfactant 2 is sodium lauryl sulfate.

- 1 23. A method of claim 11, wherein the impulse
- 2 transient has a peak pressure of 550-650 bar.
- 1 24. A method of claim 11, wherein the impulse
- 2 transient has a rise time of about 75-125 ns.